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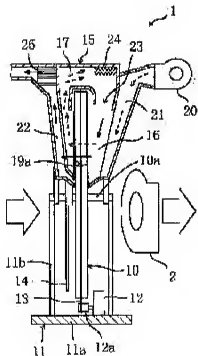
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(54) AIR CLEANING DEVICE



(57)Abstract:

PROBLEM TO BE SOLVED: To prevent the degradation in adsorption performance for a long period of time while suppressing the complication of device constitution and an increase of its cost with an air cleaning device (1) which cleans indoor air by an adsorption member (10) and reproduces the member (10) adsorbed with odorous components and hazardous components with high temperature air.

SOLUTION: A photocatalyst is included in the adsorption member (10) and is activated by irradiating the adsorption member (10) with light. The adsorption member (10) is maintained in a clean state by the effect of cracking dirt by the photocatalyst, by which the adsorption performance is assured.

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CLAIMS

[Claim(s)]

[Claim 1] The adsorption member containing the adsorbent which adsorbs the odor component or injurious ingredient in processed air (10), The playback room as space which reproduces a part of adsorption member (10) (16), A heating means to desorb an odor component or an injurious ingredient from an adsorption member (10) in a playback room (16) (24), It is the air cleaner equipped with the heat catalyst (25) which carries out oxidative degradation of the odor component or injurious ingredient from which it was desorbed. The air cleaner containing the photocatalyst which equips an adsorption member (10) with a luminescence means (14) to irradiate light, and an adsorption member (10) activates by the exposure of the light from a luminescence means (14) on a front face at least.

[Claim 2] An adsorption member (10) is an air cleaner according to claim 1 which contains the photocatalyst at 2 to 20% of a rate to the adsorbent.

[Claim 3] The air cleaner according to claim 1 or 2 with which it has wrap covering (15), a playback room (16) is formed in this covering (15), and the luminescence means (14) is arranged out of this covering (15) in a part of adsorption member (10).

[Claim 4] Claim 1 equipped with the driving means (12) which carries out the rotation drive of adsorption Rota (10) while an adsorption member is constituted by approximate circle tabular adsorption Rota (10) thru/or the air cleaner of any 1 publication of 3.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention carries out oxidative degradation of these components to which it stuck according to a catalyst under an elevated temperature, and relates to an adsorption performance degradation prevention technique especially about no-odor-izing or the air cleaner to defang while it adsorbs the odor component or injurious ingredient in processed air by the adsorption member.

[0002]

[Description of the Prior Art] Conventionally, the air cleaner is used at a store, a medical institution, works, etc. in order to remove odor components and injurious ingredients, such as the tobacco smell for example, in air, a food smell, an excrement smell, body odor, a pet smell, the Parma smell, a construction smell, lamp soot, and VOC, NOx.

[0003] In the conventional air cleaner, the adsorption member which hardened adsorbents, such as a zeolite, with the binder and was fabricated to disc-like etc. is used as indicated by JP,10-

277365,A, for example. This adsorption member has permeability so that processed air may pass, and it consists of adsorbing an odor component and an injurious ingredient at an adsorbent, in case processed air passes so that these components may be removed from processed air.

[0004] With the equipment indicated by the above-mentioned official report, while constituting a disc-like adsorption member from a drive motor pivotable, wrap covering is prepared for a part of adsorption member, and the catalyst plate and the heater are arranged as a desorption playback means in this covering. And if this adsorption section fully adsorbs an odor component and an injurious ingredient while purifying processed air in the part (adsorption section) exposed out of covering, an adsorption member will be rotated and this adsorption section will be heated within covering, the catalyst activated by this while desorbing the odor component and the injurious ingredient from the adsorption member -- these components -- decomposing ---less -- bromination -- or he is trying to defang

[0005]

[Problem(s) to be Solved by the Invention] However, if a certain amount of time amount passes using an air cleaner, suspended matter, such as dust in processed air, will adhere to the front face of an adsorption member, and dirt will be gradually accumulated in it. For this reason, the draft resistance of an adsorption member becomes large and there is a possibility that the adsorption engine performance of equipment may fall. On the other hand, although it is also possible to prepare the device in which the dirt of the front face of an adsorption member is removed in an air cleaner, there is a possibility that an equipment configuration may be complicated and cost may become high in that case.

[0006] The place which this invention is originated in view of such a trouble, and is made into the purpose is enabling it to prevent adsorption performance degradation, suppressing complication of the configuration of an air cleaner, and the rise of cost.

[0007]

[Means for Solving the Problem] Paying attention to the point of having the operation into which a photocatalyst disassembles dirt, this invention includes a photocatalyst in an adsorption member, and is made to carry out decomposition removal of the dirt.

[0008] Concretely the 1st solution means which this invention devised The adsorption member containing the adsorbent which adsorbs the odor component or injurious ingredient in processed air (10), The playback room as space which reproduces a part of adsorption member (10) (16), It is premised on the air cleaner equipped with the heat catalyst (25) which carries out oxidative degradation of the odor component or injurious ingredient from which it was desorbed to heating means (24) to desorb an odor component or an injurious ingredient from an adsorption member (10) in a playback room (16), such as a heater. And while equipping an adsorption member (10) with a luminescence means (14) to irradiate light, an adsorption member (10) considers as the configuration which contains at least the photocatalyst activated by the exposure of the light from a luminescence means (14) on a front face.

[0009] Moreover, in the solution means of the above 1st, an adsorption member (10) considers the 2nd solution means which this invention devised as the configuration which contains the photocatalyst at 2 to 20% of a rate to an adsorbent. In addition, a photocatalyst can be made about 5% to an adsorbent as a more desirable rate.

[0010] Moreover, in the above 1st or the 2nd solution means, while the 3rd solution means which this invention devised prepares wrap covering (15) for a part of adsorption member (10) and forms a playback room (16) in this covering (15), it arranges a luminescence means (14) out of this covering (15).

[0011] Moreover, in the above 1st thru/or the 3rd solution means of any 1, the 4th solution means which this invention devised constitutes an adsorption member as approximate circle tabular adsorption Rota (10), and establishes the driving means (12) which carries out the rotation drive of this adsorption Rota (10).

[0012] - With the solution means of the operation-above 1st, if an adsorption member (10) fully adsorbs the odor component or injurious ingredient in processed air, this adsorption member (10) will be reproduced in a playback room (16). In a playback room (16), an adsorption member (10) is heated at the heater formed as a heating means (24), and an odor component and an injurious ingredient are desorbed from an adsorption member (10). moreover, the air which oxidative degradation of the odor component desorbed from the adsorption member (10) or the injurious ingredient was carried out by a heat catalyst (25) being activated, and contained the odor component and the injurious ingredient --less -- bromination -- or it is defanged. And what is necessary is just to discharge the air after processing from a playback room (16) to outside the plane.

[0013] Moreover, with this 1st solution means, since the adsorption member (10) contains the photocatalyst, if light is irradiated from a luminescence means (14) at an adsorption member (10), a photocatalyst will be activated, and the dirt adhering to the front face of an adsorption member (10) will be disassembled and removed. Moreover, the activated photocatalyst decomposes the odor component and injurious ingredient by which the front face of an adsorption member (10) was adsorbed, and also performs no-odor-izing or the operation to defang.

[0014] Moreover, with the solution means of the above 2nd, since the rate of a photocatalyst to an adsorbent is specified, when a photocatalyst is superfluously included in an adsorption member (10), such an adsorbent fall can be suppressed to an adsorbent decreasing and adsorbent falling. Moreover, as a photocatalyst, it is TiO_2 . Although used, extent which has such a photocatalyst itself can also demonstrate disintegration also from having adsorbent, suppressing the fall of the adsorption capacity force, unless the content of a photocatalyst is superfluous.

[0015] Moreover, with the solution means of the above 3rd, while playback of the adsorption member (10) by the desorption of an odor component or an injurious ingredient is performed in a playback room (16), disassembly of the dirt by the photocatalyst etc. is performed out of a playback room (16).

[0016] Moreover, with the solution means of the above 4th, if the luminescence means (14) is arranged in accordance with radial [of adsorption Rota (10)] Since light can be irradiated at whole adsorption Rota (10) while adsorption Rota (10) takes at least 1 round if a luminescence means (14) is made to emit light when adsorption Rota (10) rotates, decomposition removal of the dirt can be carried out all over adsorption Rota (10).

[0017]

[Effect of the Invention] According to the solution means of the above 1st, the decomposition removal of the dirt of the front face of an adsorption member (10) can be carried out with a photocatalyst, decomposing these components that were reproduced and were desorbed from the adsorption member (10) which adsorbed the odor component and the injurious ingredient with the heating means (24) with a heat catalyst (25). Therefore, since dirt cannot adhere to the front face of an adsorption member (10) easily even if time amount passes, it can stop that prevent that the draft resistance of an adsorption member (10) becomes large, and the adsorption engine performance of equipment falls. Moreover, since the device in which dirt is removed by mechanical motion etc. is made unnecessary because it was made to carry out decomposition

removal of the dirt using the photocatalyst, complication and cost rise of an equipment configuration are also suppressed.

[0018] Moreover, since the rate of the adsorbent included in an adsorption member (10) and a photocatalyst is specified as the proper range according to the solution means of the above 2nd, it is compatible on high level with sufficient balance in the adsorption engine performance and the decomposition removal engine performance of dirt in an adsorption member (10).

[0019] Moreover, since a luminescence means (14) to remove the dirt of an adsorption member (10) is established out of the playback room (16) which reproduces an adsorption member (10) according to the solution means of the above 3rd Outside a playback room (16), the decomposition removal of the dirt of an adsorption member (10) can be carried out at coincidence, being certainly desorbed from the odor component and injurious ingredient by which the adsorption member (10) was adsorbed in a playback room (16), and decomposing.

[0020] Moreover, according to the solution means of the above 4th, by rotating adsorption Rota (10), it also becomes possible [irradiating light at this whole adsorption rotor (10)] to form a luminescence means (14) in one place, while adsorption Rota (10) takes 1 round. Therefore, in the air cleaner of the type with which the adsorption member (10) stood it still, it becomes unnecessary to many luminescence means being needed for this whole adsorption member (10), if it is going to irradiate light to establish many luminescence means such.

[0021]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained to a detail based on a drawing.

[0022] Drawing 1 is an air cleaner (1) concerning this operation gestalt. It is the sectional view showing outline structure, and drawing 2 is the front view of an air cleaner. In addition, these drawings are what showed the configuration of this invention notionally, and are equipment (1). A concrete configuration is not limited.

[0023] This air cleaner (1) Disc-like adsorption Rota (adsorption member) (10) is held pivotable with the frame (11). And blower (2) Start and adsorption Rota (10) is made to pass processed air, and by adsorbing the odor component and injurious ingredient in processed air by this adsorption rotor (10), it is constituted so that this air may be purified.

[0024] a frame (11) -- the base (11a) Stand member (11b) from -- it is constituted. Base (11a) A framework is carried out, for example with die steel, such as an angle, and a griddle etc. is stuck on the top face, and it is formed in it, and is a stand member (11b). It is the base (11a) about four lightweight die steel, pipes, etc. It is fixed and constituted. Stand member (11b) The revolving shaft (10a) fixed to the core of adsorption Rota (10) is held pivotable through the bearing unit which is not illustrated at the upper limit section.

[0025] the base (11a) **** -- adsorption Rota -- it considers as the driving means which carries out the rotation drive of (10), and the motor (12) is being fixed. The moderation device which is not illustrated is minded (12) and it is a driving pulley (12a). It is connected and is this driving pulley (12a). The belt for a drive (13) is hung on adsorption Rota (10). And it enables it to rotate adsorption Rota (10) by driving a motor (12).

[0026] adsorption Rota -- (10) -- adsorbents, such as a zeolite, and TiO₂ etc. -- a photocatalyst is hardened with a binder and it is fabricated by disc-like, and 2 to 20%, preferably, the rate of a photocatalyst to an adsorbent is set up so that it may become about 5%. This adsorption Rota (10) is fabricated for example, in the shape of a honeycomb, and it has permeability so that processed air may pass in the thickness direction. And adsorption Rota (10) is adsorbing an odor component and an injurious ingredient at an adsorbent, in case processed air passes, and it

removes these components from processed air. Concretely, adsorption Rota (10) can adsorb and remove offensive odor components, such as ammonia in air, an acetaldehyde, a trimethylamine, and methyl mercaptan, and an injurious ingredient like a carbon monoxide and formaldehyde. [0027] Moreover, the above-mentioned photocatalyst can disassemble the dirt which suspended matter, such as dust in processed air, adhered to the front face of adsorption Rota (10), and generated, and can be removed while decomposing the odor component and injurious ingredient by which the front face of adsorption Rota (10) was adsorbed by irradiating light and making it activated. And since light is irradiated at a photocatalyst, the black light lamp (14) is being fixed to the frame (11) as a luminescence means. A black light lamp (14) is mainly 360nm. While emitting an ultraviolet radiation [before and after], visible radiation is hardly taken out and a high-pressure mercury lamp or a fluorescent lamp is used. this black light lamp (14) -- adsorption Rota -- revolving shaft (10a) of (10) from -- it is arranged toward the lower part at the vertical. In addition, the above-mentioned photocatalyst also has the property as an adsorbent which adsorbs the odor component and injurious ingredient in processed air, in case processed air passes adsorption Rota (10).

[0028] On the other hand, as for adsorption Rota (10), a part of the hoop direction is covered with covering (15) from both sides, and covering (15) is the above-mentioned revolving shaft (10a). It inserts and is prepared in the black light lamp (14) and the location (vertical upper part of a revolving shaft (10a)) which counters. This covering (15) is the stand member (11b) of a frame (11). It is fixed and partition formation of the playback room (16) is carried out inside this covering (15). The playback room (16) is prepared covering both sides of adsorption Rota (10) through the free passage room (17) located above adsorption Rota (10).

[0029] In addition, covering (15) is formed in a sector with a main small include angle in the example of illustration. Although adsorption Rota (10) makes area of the part (henceforth the playback section) located in a playback room (16) the range quite narrower than the area of the part (henceforth the adsorption section) located in the outside of a playback room (16) It is also possible to change the main include angle of covering (15) within the limits of 5 to about 180 degrees, and to adjust the rate of the playback section and the adsorption section.

[0030] In the above-mentioned covering (15), the seal path (18) which makes adsorption Rota (10) pass the open air along with the edges-on-both-sides section of a playback room (16) is prepared. A seal path (18) is the narrow purge section (18a, 18a) of the width of face prepared in the edges-on-both-sides section of a playback room (16) as shown in drawing 3 which is the air flow chart of an outline. It is constituted by carrying out opposite arrangement on both sides of adsorption Rota (10). The purge section which faces (18a, 18a) Another side serves as an inlet side the blow-off side, and one side separates a shield (19) in a playback room (16), and is arranged at it, respectively. Each shield (19) is the inside edge (19a), as shown in drawing 1 . It is formed so that few clearances may be separated from the front face of adsorption Rota (10) and it may be located, and it is the building envelope and the purge section (18a) of a playback room (16). The building envelope is divided.

[0031] The purge section by the side of blow off (18a) It is open for free passage with the air installation path (21) in which the blower for playback (20) was formed. On the other hand, it is the purge section (18a) of a suction side. Although concrete structure is not shown, it is open for free passage with the playback room (16) through the free passage room (17) established in the upper part of covering (15). Moreover, the playback room (16) is open for free passage with the air discharge path (22). For this reason, the open air sent to the air installation path (21) is both the purge section (18a), when flowing a seal path (18). After crossing adsorption Rota (10) in

between and being further introduced into a playback room (16) from a free passage room (17), it is discharged from an air discharge path (22). And an air installation path (21), a seal path (18), a free passage room (17), a playback room (16), and the whole space in covering (15) which consists of an air discharge path (22) constitute the playback air duct (23).

[0032] In covering (15), an electric heater (24) and the catalyst structure (25) are arranged. The electric heater (24) is prepared in the free passage room (17), and is located in the upstream of the playback location of adsorption Rota (10) within a playback air duct (23). Moreover, the catalyst structure (25) is located in an air discharge path (22). In the above configuration, adsorption Rota (10) is heated through the air which flows a playback air duct (23) by the electric heater (24), an odor component or an injurious ingredient is desorbed from this adsorption rotor (10), and this adsorption rotor (10) is reproduced. and adsorption Rota -- the catalyst structure (25) is heated with the elevated-temperature air containing the odor component desorbed from (10), or an injurious ingredient -- these odor components or injurious ingredients -- less -- bromination -- or it is defanged.

[0033] Although the above-mentioned catalyst structure (25) was not illustrated for details, it should form the catalyst bed in the front face of the base material of the shape of a honeycomb which formed the air passage hole of many hexagons, for example, and enlarged surface area (or other various configurations). A catalyst is aluminum $2O_3$, and ZrO_2 , CeO_2 and SiO_2 . And mixture of one or more kinds of metallic oxides or this metallic oxide chosen from among zeolites, and a metal multiple oxide is made into support. The oxides of the alloy containing one or more kinds of metals chosen from among Ag, Pd, Pt, Mn, and Rh as a catalyst component and this metal or this metal or two or more kinds of such mixture are supported and constituted by this support, and it heats to predetermined temperature -- having -- being activated -- an odor component or an injurious ingredient -- decomposing -- less -- bromination -- or it defangs.

[0034] Moreover, the above-mentioned electric heater (24) should unite many heat transfer fins with the heating element of the shape for example, of a rod, and should expand the heating area. Although what is necessary is just to set up the concrete configuration and the structure of a heating element suitably according to the configuration of the part which arranges an electric heater (24) etc., a sheath heater, a semi-conductor heater, or a ceramic heater can specifically be used for them. In addition, although the electric heater (24) is prepared only in one place with this operation gestalt, a heater is arranged also near the upstream of air to the catalyst structure (25), and it is good even if another in the above-mentioned heater (24) for playback of an adsorption member (10), and the heater which is not illustrated for catalyst heating. Moreover, if a catalyst bed is formed in the front face of the heater for catalyst heating in that case, it is also possible to unify the heater and the catalyst structure (25) for catalyst heating.

[0035] In the above configuration, after the open air will be sent to a seal path (18) (air current of the broken-line arrow head of drawing 1) and will pass an electric heater (24) at a free passage room (17) further from an air installation path (21) as the flow of the air of an outline is shown in drawing 1 and drawing 3 if the blower for playback (20) is driven, it flows into a playback room (16). After this air passes adsorption Rota (10) in a playback room (16), it passes along an air discharge path (22), passes the catalyst structure (25), and is discharged outside (air current of the continuous-line arrow head of drawing 1).

[0036] In this operation gestalt, air cleaning is performed using the part (adsorption section) out of which adsorption Rota (10) has come out of covering (15). And if this adsorption section fully adsorbs an odor component and an injurious ingredient and reaches a saturation state mostly, it

will reproduce in a playback room (16).

[0037] this air cleaner (1) Two or more machines (M) which generate an odor and harmful gas in works as it is installed in works etc. and shown in drawing 4 Duct (D) it connects -- having -- these machines (M) exhaust gas etc. -- this duct (D) from -- absorbing -- adsorption Rota -- (10) -- less -- bromination -- or it is constituted so that it may defang. And each machine (M) It is a duct (D) before being spread to the space where the odor component and injurious ingredient which were generated are large. It is one set (1) of an air cleaner, without using two or more sets of air cleaners also in a large location by having adopted the method to absorb. It enables it to process.

[0038] In addition, this air cleaner (1) Other than works, it may install in a commercial building, a medical institution, etc., and may connect by two or more rooms and ducts, and you may use for removing the odor component and injurious ingredient in the air of each part store. Moreover, this air cleaner (1) In the large indoor space of amusement facilities, such as a pachinko amusement center, it may connect by two or more strong head-lining part and strong ducts of a zone, such as an odor, and you may use for removing the odor component and injurious ingredient of each zone.

[0039] - Operation actuation -, next this air cleaner (1) Operation actuation is explained concretely.

[0040] First, during air cleaning operation, it is in the condition of having started the drive motor (12) and having rotated adsorption Rota (10), and each blower (2 20) is started. that that is right, then this air cleaner (1) **** -- since the adsorption section located outside a playback room (16) is formed in the large field, air cleaning is efficiently performed using that large adsorption section to the field where the playback section located in a playback room (16) is narrow, and an odor component and an injurious ingredient are removed from processed air to it. In addition, extent which these odor components and injurious ingredients have not only in an adsorbent but in a photocatalyst is adsorbed.

[0041] At this time, within covering (15), it energizes to an electric heater (24) and regeneration is also performed to coincidence. If it explains concretely that the air at the time of this playback of adsorption Rota (10) flows, the open air will flow a seal path (18) from an air installation path (21) first. a seal path (18) -- air -- the purge section by the side of blow off (18a) from -- adsorption Rota -- (10) -- crossing -- the purge section (18a) of a suction side It flows. It passes at this time, absorbing heat from an adsorption rotor (adsorption Rota (10) by which desorption of the odor component adhering to adsorption Rota (10) or an injurious ingredient is not performed at a seal path (18), but the open air has already been heated since the air which passes 10) is ordinary temperature).

[0042] The purge section of a suction side (18a) The air which entered flows into the free passage room (17) established in the upper part in covering (15), and is further heated by the electric heater (24) which has already generated heat. The air which became an elevated temperature passes adsorption Rota (10). Thus, when hot air passes adsorption Rota (10), an odor component and an injurious ingredient are desorbed from adsorption Rota (10) in a playback room (16). Moreover, these components from which it was desorbed are contained in regeneration air, and flow an air discharge path (22). since a catalyst is activated at this time because hot air flows -- adsorption Rota -- these components desorbed from (10) carry out oxidative degradation -- having -- less -- bromination -- or it is defanged.

[0043] in order that the air current (refer to the arrow head of a broken line) which flow a seal path (18) in the edges on both sides section of a playback room (16) act as shielding although an

odor component and an injurious ingredient **** in case air pass adsorption Rota (10) from the right of drawing 1 to a left in a playback room (16) (refer to the arrow head of a continuous line), an odor leak from a playback room (16) to the exterior in this operation gestalt. Even if the air containing an odor component etc. flows out of a shield (19), the air will be included in the air current which flows a seal path (18), it will flow into a playback room (16) from a free passage room (17) again, and the odor leakage by the exterior will be prevented. Moreover, the heat of elevated-temperature air is similarly absorbed by the air which flows from a free passage room (17) to a playback room (16). And the air after reproducing adsorption Rota (10) is emitted outside the plane from an air discharge path (22) by passing the catalyst structure (25) as pure air into which the odor component and the injurious ingredient were decomposed.

[0044] On the other hand, it is an air cleaner (1). During operation, a black light lamp (14) emits light and light is irradiated by adsorption Rota (10) outside covering (15). For this reason, a photocatalyst is activated in the front face of adsorption Rota (10), and the odor component and injurious ingredient by which the front face of this adsorption rotor (10) was adsorbed are decomposed to some extent. Moreover, although suspended matter, such as dust in air, adheres to the front face of adsorption Rota (10) and dirt is attached because processed air passes adsorption Rota (10), decomposition removal of this dirt is carried out by a photocatalyst being activated. Therefore, the front face of adsorption Rota (10) is maintained by the pure condition [long duration].

[0045] - Effectiveness of an operation gestalt - As mentioned above, since dirt hardly adheres to the front face of adsorption Rota (10) according to this operation gestalt, even if time amount passes, it can prevent that the draft resistance of adsorption Rota (10) becomes large. For this reason, equipment (1) The adsorption engine performance is maintainable over a long period of time. Moreover, since it is not necessary to establish the device in which the dirt of the front face of adsorption Rota (10) is removed by mechanical motion, it can stop that an equipment configuration is complicated or cost becomes high.

[0046] Furthermore, according to this operation gestalt, by reproducing adsorption Rota (10), even if it does not exchange adsorption Rota (10), the air cleaning engine performance does not fall, but the high purification engine performance can be maintained. In addition, the suspension bacillus in the spore of mold or air adheres to adsorption Rota (10) at a remarkable rate, and since these can be annihilated with heating at the time of playback of adsorption Rota (10), mold etc. can also suppress the odor generated owing to.

[0047] Moreover, covering (15) is formed in a comparatively narrow field, and since area of the adsorption section used for air cleaning is enlarged, sufficient air cleaning engine performance is securable with this operation gestalt, using the large area. And since he is trying to reproduce adsorption Rota (10) to coincidence by other parts (that is, playback section in a playback room (16), purifying air using a part of adsorption Rota (10) (that is, adsorption section of the exterior of covering (15)), it can continue over a long period of time, without making air cleaning operation break off conjointly with dirt not adhering to the front face of adsorption Rota (10).

[0048] - In the modification-<modification 1> above-mentioned implementation gestalt of an operation gestalt, as the flow of the air of an outline is shown, for example in drawing 5, the heat exchanger (26) which performs heat exchange between the air which flows the above-mentioned air installation path (21), and the air discharged from an air discharge path (22) may be prepared. A helical traveling wave tube heat exchanger with a radiation fin, a double pipe heat exchanger, etc. can be used for this heat exchanger (26).

[0049] Thus, if constituted, the open air will be heated by the heat which the air [finishing /

processing] discharged has, when passing a heat exchanger (26) first. With this heat, the open air is not heated at the forge fire from which the odor component of adsorption Rota (10) etc. is desorbed, but when flowing the seal path (18) of the both sides of a playback room (16), it only passes adsorption Rota (10). Then, when it passes along a free passage room (17) like an operation gestalt, air is heated by the elevated temperature by the electric heater (24), and goes into a playback room (16). Therefore, an odor component and an injurious ingredient are desorbed from adsorption Rota (10) with this elevated-temperature air.

[0050] Then, air turns into pure air from a playback room (16) through an air discharge path (22), and when discharged outside, it passes along a heat exchanger (26). Therefore, the air after processing will be discharged outside the plane, after giving heat to the air introduced from the outside and being cooled.

[0051] Therefore, even if it suppresses the capacity of an electric heater (24), air can be heated efficiently, activation of the desorption of the odor component from adsorption Rota (10) or an injurious ingredient and a catalyst can fully be performed, and it becomes possible to attain energy saving.

[0052] At the <modification 2> above-mentioned implementation gestalt, it is a blower for adsorption (2). You may make it use a part of pure air after purification (about ten percent of the whole) for playback of adsorption Rota (10), although the blower for playback (20) is used separately instead of using the blower for playback, as shown in drawing 6. A branching duct (31) is connected to the duct (30) which introduces the air after purification indoors, and a damper (32) is formed in this branching duct (31), and it enables it to supply the playback section in the example of illustration concretely, adjusting the airflow of the air for playback.

[0053] It will be equipment (1) if it does in this way. Since the number of the blower to be used can be reduced and fear of failure decreases, it is equipment (1). Dependability is raised. Moreover, in order to use the pure air after purifying for playback, there is an advantage to which an odor component etc. tends to be desorbed from adsorption Rota (10).

[0054] air cleaner (1) of the <modification 3> above-mentioned implementation gestalt **** -- always -- adsorption Rota -- although (10) is rotated, and coincidence is followed and it is made to perform air cleaning and playback -- under air cleaning -- adsorption Rota -- (10) is rotated intermittently and you may make it reproduce

[0055] May start a drive motor (12), if air cleaning operation is performed predetermined time, may specifically use a timer so that predetermined include-angle rotation of adsorption Rota (10) may be carried out, and If the concentration of the odor component in the air in the downstream of the adsorption section of adsorption Rota (10) or an injurious ingredient is detected and the concentration exceeds a predetermined value, it judges that the purification engine performance fell and you may make it start a drive motor (12). in addition -- for example, when using a timer, when air cleaning is performed to the activity within a time of a man in the daytime and there is not a man at night, it enables it to reproduce, or can enable it to repeat adsorption and playback several times among one day Even if such, it is possible to continue without making air cleaning operation break off.

[0056] Moreover, after performing air cleaning as other operating methods using whole adsorption Rota (10), it may be made to carry out by summarizing playback. In this case, during air cleaning operation, it is in the condition of having suspended the drive motor (12) and having made adsorption Rota (10) standing it still, and is a blower (2). It starts. If it does so, an odor component and an injurious ingredient will be removed from indoor air using the large adsorption section located out of covering (15).

[0057] On the other hand, if the air cleaning engine performance of adsorption Rota (10) falls in this condition, a drive motor (12) will be started, predetermined include-angle rotation of adsorption Rota (10) will be carried out, it will energize to the blower for playback (20), and an electric heater (24), and regeneration of adsorption Rota (10) will be started. And after playback of the part in a playback room (16) finishes, it is good to carry out predetermined include-angle rotation of adsorption Rota (10) again, to reproduce the following part, and to reproduce adsorption Rota (10) to the whole by repeating this partial playback several times.

[0058] In this case, that steam is also discharged when a steam is generated by heating adsorption Rota (10) at the time of playback, in order to discharge the air inside a playback room (16) from an air discharge path (22) and to perform it, introducing the open air for playback of adsorption Rota (10) from an air installation path (21). Therefore, it is equipment (1) after reproductive termination. It is equipment (1) even if cooled to ordinary temperature. It can prevent that dew condensation arises inside. For this reason, dew condensation is equipment (1) owing to. There is also an advantage which can prevent that mold and rust are generated inside or waterdrop leaks to it indoors.

[0059]

[The gestalt of operation of others of invention] Moreover, this invention is good also as following configurations about the above-mentioned operation gestalt.

[0060] For example, although it constitutes from each above-mentioned operation gestalt so that an adsorption member may be made into adsorption Rota (10) and the rotation drive of this adsorption rotor (10) may be carried out with a drive motor (12), an adsorption member may be made the configuration of those other than adsorption Rota (10). For example, an adsorption member is formed in rectangle tabular and wrap covering is constituted for the part movable in the direction of a field of an adsorption member, and you may make it reproduce an adsorption member, making a playback room change, and may make it other configurations.

[0061] Moreover, the above-mentioned air cleaner (1) You may use for the air-conditioning system combined with the conditioner. In that case, an air-conditioning system is the above-mentioned air cleaner (1). It receives, and an electrostatic precipitator can be arranged to the upstream of air, a conditioner can be arranged to the downstream, and it can constitute. An electrostatic precipitator can give a charge to suspended matter, such as dust in air, using corona discharge, and what was constituted so that uptake of this electrified suspended matter might be carried out to an electrode can be used for it. Furthermore, an electrostatic precipitator and an air cleaner (1) In between, a pre-filter may be arranged, and you may constitute so that the tar of the cigarette contained in air etc. may be removed beforehand.

[0062] Thus, an electrostatic precipitator and an air cleaner (1) Since harmony air is generable after removing an odor component and an injurious ingredient, while removing the dust which floats in air if a conditioner is arranged in order and an air-conditioning system is constituted, the interior of a room is maintainable in the very comfortable and pure condition.

[0063] Moreover, in addition to the catalyst structure (25) of the above-mentioned operation gestalt, another catalyst structure may be added and prepared in the location of the upstream of adsorption Rota (10) in a free passage room (17) and a playback room (16) etc. If it does in this way, in the catalyst structure (25) being located in the upstream of adsorption Rota (10), the pure air for playback will pass adsorption Rota (10), and desorption, such as an odor component, will be performed effectively.

[0064] Moreover, as a photocatalyst, it is TiO_2 , CdS , CdSe , WO_3 and Fe_2O_3 , SrTiO_3 , ZnO , ZnO_2 and RuO_2 , Cs_3Sb , InAs , InSb , GaAs , etc. the thing that supported these and supported

metals, such as platinum, at the base may be used for others. Furthermore, an ultraviolet ray lamp etc. may be used for a luminescence means (14) that what is necessary is just to include a photocatalyst in the front face of adsorption Rota (10) at least.

TECHNICAL FIELD

[Field of the Invention] This invention carries out oxidative degradation of these components to which it stuck according to a catalyst under an elevated temperature, and relates to an adsorption performance degradation prevention technique especially about no-odor-izing or the air cleaner to defang while it adsorbs the odor component or injurious ingredient in processed air by the adsorption member.

PRIOR ART

[Description of the Prior Art] Conventionally, the air cleaner is used at a store, a medical institution, works, etc. in order to remove odor components and injurious ingredients, such as the tobacco smell for example, in air, a food smell, an excrement smell, body odor, a pet smell, the Parma smell, a construction smell, lamp soot, and VOC, NOx.

[0003] In the conventional air cleaner, the adsorption member which hardened adsorbents, such as a zeolite, with the binder and was fabricated to disc-like etc. is used as indicated by JP,10-277365,A, for example. This adsorption member has permeability so that processed air may pass, and it consists of adsorbing an odor component and an injurious ingredient at an adsorbent, in case processed air passes so that these components may be removed from processed air.

[0004] With the equipment indicated by the above-mentioned official report, while constituting a disc-like adsorption member from a drive motor pivotable, wrap covering is prepared for a part of adsorption member, and the catalyst plate and the heater are arranged as a desorption playback means in this covering. And if this adsorption section fully adsorbs an odor component and an injurious ingredient while purifying processed air in the part (adsorption section) exposed out of covering, an adsorption member will be rotated and this adsorption section will be heated within covering, the catalyst activated by this while desorbing the odor component and the injurious ingredient from the adsorption member -- these components -- decomposing ---less -- bromination -- or he is trying to defang

EFFECT OF THE INVENTION

[Effect of the Invention] According to the solution means of the above 1st, the decomposition removal of the dirt of the front face of an adsorption member (10) can be carried out with a photocatalyst, decomposing these components that were reproduced and were desorbed from the adsorption member (10) which adsorbed the odor component and the injurious ingredient with the heating means (24) with a heat catalyst (25). Therefore, since dirt cannot adhere to the front face of an adsorption member (10) easily even if time amount passes, it can stop that prevent that the draft resistance of an adsorption member (10) becomes large, and the adsorption engine performance of equipment falls. Moreover, since the device in which dirt is removed by

mechanical motion etc. is made unnecessary because it was made to carry out decomposition removal of the dirt using the photocatalyst, complication and cost rise of an equipment configuration are also suppressed.

[0018] Moreover, since the rate of the adsorbent included in an adsorption member (10) and a photocatalyst is specified as the proper range according to the solution means of the above 2nd, it is compatible on high level with sufficient balance in the adsorption engine performance and the decomposition removal engine performance of dirt in an adsorption member (10).

[0019] Moreover, since a luminescence means (14) to remove the dirt of an adsorption member (10) is established out of the playback room (16) which reproduces an adsorption member (10) according to the solution means of the above 3rd Outside a playback room (16), the decomposition removal of the dirt of an adsorption member (10) can be carried out at coincidence, being certainly desorbed from the odor component and injurious ingredient by which the adsorption member (10) was adsorbed in a playback room (16), and decomposing.

[0020] Moreover, according to the solution means of the above 4th, by rotating adsorption Rota (10), it also becomes possible [irradiating light at this whole adsorption rotor (10)] to form a luminescence means (14) in one place, while adsorption Rota (10) takes 1 round. Therefore, in the air cleaner of the type with which the adsorption member (10) stood it still, it becomes unnecessary to many luminescence means being needed for this whole adsorption member (10), if it is going to irradiate light to establish many luminescence means such.

[0021]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained to a detail based on a drawing.

[0022] Drawing 1 is an air cleaner (1) concerning this operation gestalt. It is the sectional view showing outline structure, and drawing 2 is the front view of an air cleaner. In addition, these drawings are what showed the configuration of this invention notionally, and are equipment (1). A concrete configuration is not limited.

[0023] This air cleaner (1) Disc-like adsorption Rota (adsorption member) (10) is held pivotable with the frame (11). And blower (2) Start and adsorption Rota (10) is made to pass processed air, and by adsorbing the odor component and injurious ingredient in processed air by this adsorption rotor (10), it is constituted so that this air may be purified.

[0024] a frame (11) -- the base (11a) Stand member (11b) from -- it is constituted. Base (11a) A framework is carried out, for example with die steel, such as an angle, and a griddle etc. is stuck on the top face, and it is formed in it, and is a stand member (11b). It is the base (11a) about four lightweight die steel, pipes, etc. It is fixed and constituted. Stand member (11b) The revolving shaft (10a) fixed to the core of adsorption Rota (10) is held pivotable through the bearing unit which is not illustrated at the upper limit section.

[0025] the base (11a) **** -- adsorption Rota -- it considers as the driving means which carries out the rotation drive of (10), and the motor (12) is being fixed. The moderation device which is not illustrated is minded (12) and it is a driving pulley (12a). It is connected and is this driving pulley (12a). The belt for a drive (13) is hung on adsorption Rota (10). And it enables it to rotate adsorption Rota (10) by driving a motor (12).

[0026] adsorption Rota -- (10) -- adsorbents, such as a zeolite, and TiO₂ etc. -- a photocatalyst is hardened with a binder and it is fabricated by disc-like, and 2 to 20%, preferably, the rate of a photocatalyst to an adsorbent is set up so that it may become about 5%. This adsorption Rota (10) is fabricated for example, in the shape of a honeycomb, and it has permeability so that processed air may pass in the thickness direction. And adsorption Rota (10) is adsorbing an odor

component and an injurious ingredient at an adsorbent, in case processed air passes, and it removes these components from processed air. Concretely, adsorption Rota (10) can adsorb and remove offensive odor components, such as ammonia in air, an acetaldehyde, a trimethylamine, and methyl mercaptan, and an injurious ingredient like a carbon monoxide and formaldehyde.

[0027] Moreover, the above-mentioned photocatalyst can disassemble the dirt which suspended matter, such as dust in processed air, adhered to the front face of adsorption Rota (10), and generated, and can be removed while decomposing the odor component and injurious ingredient by which the front face of adsorption Rota (10) was adsorbed by irradiating light and making it activated. And since light is irradiated at a photocatalyst, the black light lamp (14) is being fixed to the frame (11) as a luminescence means. A black light lamp (14) is mainly 360nm. While emitting an ultraviolet radiation [before and after], visible radiation is hardly taken out and a high-pressure mercury lamp or a fluorescent lamp is used. this black light lamp (14) -- adsorption Rota -- revolving shaft (10a) of (10) from -- it is arranged toward the lower part at the vertical. In addition, the above-mentioned photocatalyst also has the property as an adsorbent which adsorbs the odor component and injurious ingredient in processed air, in case processed air passes adsorption Rota (10).

[0028] On the other hand, as for adsorption Rota (10), a part of the hoop direction is covered with covering (15) from both sides, and covering (15) is the above-mentioned revolving shaft (10a). It inserts and is prepared in the black light lamp (14) and the location (vertical upper part of a revolving shaft (10a)) which counters. This covering (15) is the stand member (11b) of a frame (11). It is fixed and partition formation of the playback room (16) is carried out inside this covering (15). The playback room (16) is prepared covering both sides of adsorption Rota (10) through the free passage room (17) located above adsorption Rota (10).

[0029] In addition, covering (15) is formed in a sector with a main small include angle in the example of illustration. Although adsorption Rota (10) makes area of the part (henceforth the playback section) located in a playback room (16) the range quite narrower than the area of the part (henceforth the adsorption section) located in the outside of a playback room (16) It is also possible to change the main include angle of covering (15) within the limits of 5 to about 180 degrees, and to adjust the rate of the playback section and the adsorption section.

[0030] In the above-mentioned covering (15), the seal path (18) which makes adsorption Rota (10) pass the open air along with the edges-on-both-sides section of a playback room (16) is prepared. A seal path (18) is the narrow purge section (18a, 18a) of the width of face prepared in the edges-on-both-sides section of a playback room (16) as shown in [drawing 3](#) which is the air flow chart of an outline. It is constituted by carrying out opposite arrangement on both sides of adsorption Rota (10). The purge section which faces (18a, 18a) Another side serves as an inlet side the blow-off side, and one side separates a shield (19) in a playback room (16), and is arranged at it, respectively. Each shield (19) is the inside edge (19a), as shown in [drawing 1](#) . It is formed so that few clearances may be separated from the front face of adsorption Rota (10) and it may be located, and it is the building envelope and the purge section (18a) of a playback room (16). The building envelope is divided.

[0031] The purge section by the side of blow off (18a) It is open for free passage with the air installation path (21) in which the blower for playback (20) was formed. On the other hand, it is the purge section (18a) of a suction side. Although concrete structure is not shown, it is open for free passage with the playback room (16) through the free passage room (17) established in the upper part of covering (15). Moreover, the playback room (16) is open for free passage with the air discharge path (22). For this reason, the open air sent to the air installation path (21) is both

the purge section (18a), when flowing a seal path (18). After crossing adsorption Rota (10) in between and being further introduced into a playback room (16) from a free passage room (17), it is discharged from an air discharge path (22). And an air installation path (21), a seal path (18), a free passage room (17), a playback room (16), and the whole space in covering (15) which consists of an air discharge path (22) constitute the playback air duct (23).

[0032] In covering (15), an electric heater (24) and the catalyst structure (25) are arranged. The electric heater (24) is prepared in the free passage room (17), and is located in the upstream of the playback location of adsorption Rota (10) within a playback air duct (23). Moreover, the catalyst structure (25) is located in an air discharge path (22). In the above configuration, adsorption Rota (10) is heated through the air which flows a playback air duct (23) by the electric heater (24), an odor component or an injurious ingredient is desorbed from this adsorption rotor (10), and this adsorption rotor (10) is reproduced. and adsorption Rota -- the catalyst structure (25) is heated with the elevated-temperature air containing the odor component desorbed from (10), or an injurious ingredient -- these odor components or injurious ingredients - --less -- bromination -- or it is defanged.

[0033] Although the above-mentioned catalyst structure (25) was not illustrated for details, it should form the catalyst bed in the front face of the base material of the shape of a honeycomb which formed the air passage hole of many hexagons, for example, and enlarged surface area (or other various configurations). A catalyst is aluminum 2O3, and ZrO2, CeO2 and SiO2. And mixture of one or more kinds of metallic oxides or this metallic oxide chosen from from among zeolites, and a metalel multiple oxide is made into support. The oxides of the alloy containing one or more kinds of metals chosen from from among Ag, Pd, Pt, Mn, and Rh as a catalyst component and this metal or this metal or two or more kinds of such mixture are supported and constituted by this support. and it heats to predetermined temperature -- having -- being activated -- an odor component or an injurious ingredient -- decomposing ---less -- bromination -- or it defangs.

[0034] Moreover, the above-mentioned electric heater (24) should unite many heat transfer fins with the heating element of the shape for example, of a rod, and should expand the heating area. Although what is necessary is just to set up the concrete configuration and the structure of a heating element suitably according to the configuration of the part which arranges an electric heater (24) etc., a sheath heater, a semi-conductor heater, or a ceramic heater can specifically be used for them. In addition, although the electric heater (24) is prepared only in one place with this operation gestalt, a heater is arranged also near the upstream of air to the catalyst structure (25), and it is good even if another in the above-mentioned heater (24) for playback of an adsorption member (10), and the heater which is not illustrated for catalyst heating. Moreover, if a catalyst bed is formed in the front face of the heater for catalyst heating in that case, it is also possible to unify the heater and the catalyst structure (25) for catalyst heating.

[0035] In the above configuration, after the open air will be sent to a seal path (18) (air current of the broken-line arrow head of drawing 1) and will pass an electric heater (24) at a free passage room (17) further from an air installation path (21) as the flow of the air of an outline is shown in drawing 1 and drawing 3 if the blower for playback (20) is driven, it flows into a playback room (16). After this air passes adsorption Rota (10) in a playback room (16), it passes along an air discharge path (22), passes the catalyst structure (25), and is discharged outside (air current of the continuous-line arrow head of drawing 1).

[0036] In this operation gestalt, air cleaning is performed using the part (adsorption section) out of which adsorption Rota (10) has come out of covering (15). And if this adsorption section fully

adsorbs an odor component and an injurious ingredient and reaches a saturation state mostly, it will reproduce in a playback room (16).

[0037] this air cleaner (1) Two or more machines (M) which generate an odor and harmful gas in works as it is installed in works etc. and shown in drawing 4 Duct (D) it connects -- having -- these machines (M) exhaust gas etc. -- this duct (D) from -- absorbing -- adsorption Rota -- (10) -- less -- bromination -- or it is constituted so that it may defang. And each machine (M) It is a duct (D) before being spread to the space where the odor component and injurious ingredient which were generated are large. It is one set (1) of an air cleaner, without using two or more sets of air cleaners also in a large location by having adopted the method to absorb. It enables it to process.

[0038] In addition, this air cleaner (1) Other than works, it may install in a commercial building, a medical institution, etc., and may connect by two or more rooms and ducts, and you may use for removing the odor component and injurious ingredient in the air of each part store. Moreover, this air cleaner (1) In the large indoor space of amusement facilities, such as a pachinko amusement center, it may connect by two or more strong head-lining part and strong ducts of a zone, such as an odor, and you may use for removing the odor component and injurious ingredient of each zone.

[0039] - Operation actuation -, next this air cleaner (1) Operation actuation is explained concretely.

[0040] First, during air cleaning operation, it is in the condition of having started the drive motor (12) and having rotated adsorption Rota (10), and each blower (2 20) is started. that that is right, then this air cleaner (1) **** -- since the adsorption section located outside a playback room (16) is formed in the large field, air cleaning is efficiently performed using that large adsorption section to the field where the playback section located in a playback room (16) is narrow, and an odor component and an injurious ingredient are removed from processed air to it. In addition, extent which these odor components and injurious ingredients have not only in an adsorbent but in a photocatalyst is adsorbed.

[0041] At this time, within covering (15), it energizes to an electric heater (24) and regeneration is also performed to coincidence. If it explains concretely that the air at the time of this playback of adsorption Rota (10) flows, the open air will flow a seal path (18) from an air installation path (21) first. a seal path (18) -- air -- the purge section by the side of blow off (18a) from -- adsorption Rota -- (10) -- crossing -- the purge section (18a) of a suction side It flows. It passes at this time, absorbing heat from an adsorption rotor (adsorption Rota (10) by which desorption of the odor component adhering to adsorption Rota (10) or an injurious ingredient is not performed at a seal path (18), but the open air has already been heated since the air which passes 10) is ordinary temperature).

[0042] The purge section of a suction side (18a) The air which entered flows into the free passage room (17) established in the upper part in covering (15), and is further heated by the electric heater (24) which has already generated heat. The air which became an elevated temperature passes adsorption Rota (10). Thus, when hot air passes adsorption Rota (10), an odor component and an injurious ingredient are desorbed from adsorption Rota (10) in a playback room (16). Moreover, these components from which it was desorbed are contained in regeneration air, and flow an air discharge path (22). since a catalyst is activated at this time because hot air flows -- adsorption Rota -- these components desorbed from (10) carry out oxidative degradation -- having -- less -- bromination -- or it is defanged.

[0043] in order that the air current (refer to the arrow head of a broken line) which flow a seal

path (18) in the edges on both sides section of a playback room (16) act as shielding although an odor component and an injurious ingredient **** in case air pass adsorption Rota (10) from the right of drawing 1 to a left in a playback room (16) (refer to the arrow head of a continuous line), an odor leak from a playback room (16) to the exterior in this operation gestalt. Even if the air containing an odor component etc. flows out of a shield (19), the air will be included in the air current which flows a seal path (18), it will flow into a playback room (16) from a free passage room (17) again, and the odor leakage by the exterior will be prevented. Moreover, the heat of elevated-temperature air is similarly absorbed by the air which flows from a free passage room (17) to a playback room (16). And the air after reproducing adsorption Rota (10) is emitted outside the plane from an air discharge path (22) by passing the catalyst structure (25) as pure air into which the odor component and the injurious ingredient were decomposed.

[0044] On the other hand, it is an air cleaner (1). During operation, a black light lamp (14) emits light and light is irradiated by adsorption Rota (10) outside covering (15). For this reason, a photocatalyst is activated in the front face of adsorption Rota (10), and the odor component and injurious ingredient by which the front face of this adsorption rotor (10) was adsorbed are decomposed to some extent. Moreover, although suspended matter, such as dust in air, adheres to the front face of adsorption Rota (10) and dirt is attached because processed air passes adsorption Rota (10), decomposition removal of this dirt is carried out by a photocatalyst being activated. Therefore, the front face of adsorption Rota (10) is maintained by the pure condition [long duration].

[0045] - Effectiveness of an operation gestalt - As mentioned above, since dirt hardly adheres to the front face of adsorption Rota (10) according to this operation gestalt, even if time amount passes, it can prevent that the draft resistance of adsorption Rota (10) becomes large. For this reason, equipment (1) The adsorption engine performance is maintainable over a long period of time. Moreover, since it is not necessary to establish the device in which the dirt of the front face of adsorption Rota (10) is removed by mechanical motion, it can stop that an equipment configuration is complicated or cost becomes high.

[0046] Furthermore, according to this operation gestalt, by reproducing adsorption Rota (10), even if it does not exchange adsorption Rota (10), the air cleaning engine performance does not fall, but the high purification engine performance can be maintained. In addition, the suspension bacillus in the spore of mold or air adheres to adsorption Rota (10) at a remarkable rate, and since these can be annihilated with heating at the time of playback of adsorption Rota (10), mold etc. can also suppress the odor generated owing to.

[0047] Moreover, covering (15) is formed in a comparatively narrow field, and since area of the adsorption section used for air cleaning is enlarged, sufficient air cleaning engine performance is securable with this operation gestalt, using the large area. And since he is trying to reproduce adsorption Rota (10) to coincidence by other parts (that is, playback section in a playback room (16)), purifying air using a part of adsorption Rota (10) (that is, adsorption section of the exterior of covering (15)), it can continue over a long period of time, without making air cleaning operation break off conjointly with dirt not adhering to the front face of adsorption Rota (10).

[0048] - In the modification-<modification 1> above-mentioned implementation gestalt of an operation gestalt, as the flow of the air of an outline is shown, for example in drawing 5, the heat exchanger (26) which performs heat exchange between the air which flows the above-mentioned air installation path (21), and the air discharged from an air discharge path (22) may be prepared. A helical traveling wave tube heat exchanger with a radiation fin, a double pipe heat exchanger, etc. can be used for this heat exchanger (26).

[0049] Thus, if constituted, the open air will be heated by the heat which the air [finishing / processing] discharged has, when passing a heat exchanger (26) first. With this heat, the open air is not heated at the forge fire from which the odor component of adsorption Rota (10) etc. is desorbed, but when flowing the seal path (18) of the both sides of a playback room (16), it only passes adsorption Rota (10). Then, when it passes along a free passage room (17) like an operation gestalt, air is heated by the elevated temperature by the electric heater (24), and goes into a playback room (16). Therefore, an odor component and an injurious ingredient are desorbed from adsorption Rota (10) with this elevated-temperature air.

[0050] Then, air turns into pure air from a playback room (16) through an air discharge path (22), and when discharged outside, it passes along a heat exchanger (26). Therefore, the air after processing will be discharged outside the plane, after giving heat to the air introduced from the outside and being cooled.

[0051] Therefore, even if it suppresses the capacity of an electric heater (24), air can be heated efficiently, activation of the desorption of the odor component from adsorption Rota (10) or an injurious ingredient and a catalyst can fully be performed, and it becomes possible to attain energy saving.

[0052] At the <modification 2> above-mentioned implementation gestalt, it is a blower for adsorption (2). You may make it use a part of pure air after purification (about ten percent of the whole) for playback of adsorption Rota (10), although the blower for playback (20) is used separately instead of using the blower for playback, as shown in drawing 6. A branching duct (31) is connected to the duct (30) which introduces the air after purification indoors, and a damper (32) is formed in this branching duct (31), and it enables it to supply the playback section in the example of illustration concretely, adjusting the airflow of the air for playback.

[0053] It will be equipment (1) if it does in this way. Since the number of the blower to be used can be reduced and fear of failure decreases, it is equipment (1). Dependability is raised. Moreover, in order to use the pure air after purifying for playback, there is an advantage to which an odor component etc. tends to be desorbed from adsorption Rota (10).

[0054] air cleaner (1) of the <modification 3> above-mentioned implementation gestalt **** -- always -- adsorption Rota -- although (10) is rotated, and coincidence is followed and it is made to perform air cleaning and playback -- under air cleaning -- adsorption Rota -- (10) is rotated intermittently and you may make it reproduce

[0055] May start a drive motor (12), if air cleaning operation is performed predetermined time, may specifically use a timer so that predetermined include-angle rotation of adsorption Rota (10) may be carried out, and If the concentration of the odor component in the air in the downstream of the adsorption section of adsorption Rota (10) or an injurious ingredient is detected and the concentration exceeds a predetermined value, it judges that the purification engine performance fell and you may make it start a drive motor (12), in addition -- for example, when using a timer, when air cleaning is performed to the activity within a time of a man in the daytime and there is not a man at night, it enables it to reproduce, or can enable it to repeat adsorption and playback several times among one day Even if such, it is possible to continue without making air cleaning operation break off.

[0056] Moreover, after performing air cleaning as other operating methods using whole adsorption Rota (10), it may be made to carry out by summarizing playback. In this case, during air cleaning operation, it is in the condition of having suspended the drive motor (12) and having made adsorption Rota (10) standing it still, and is a blower (2). It starts. If it does so, an odor component and an injurious ingredient will be removed from indoor air using the large

adsorption section located out of covering (15).

[0057] On the other hand, if the air cleaning engine performance of adsorption Rota (10) falls in this condition, a drive motor (12) will be started, predetermined include-angle rotation of adsorption Rota (10) will be carried out, it will energize to the blower for playback (20), and an electric heater (24), and regeneration of adsorption Rota (10) will be started. And after playback of the part in a playback room (16) finishes, it is good to carry out predetermined include-angle rotation of adsorption Rota (10) again, to reproduce the following part, and to reproduce adsorption Rota (10) to the whole by repeating this partial playback several times.

[0058] In this case, that steam is also discharged when a steam is generated by heating adsorption Rota (10) at the time of playback, in order to discharge the air inside a playback room (16) from an air discharge path (22) and to perform it, introducing the open air for playback of adsorption Rota (10) from an air installation path (21). Therefore, it is equipment (1) after reproductive termination. It is equipment (1) even if cooled to ordinary temperature. It can prevent that dew condensation arises inside. For this reason, dew condensation is equipment (1) owing to. There is also an advantage which can prevent that mold and rust are generated inside or waterdrop leaks to it indoors.

[0059]

[The gestalt of operation of others of invention] Moreover, this invention is good also as following configurations about the above-mentioned operation gestalt.

[0060] For example, although it constitutes from each above-mentioned operation gestalt so that an adsorption member may be made into adsorption Rota (10) and the rotation drive of this adsorption rotor (10) may be carried out with a drive motor (12), an adsorption member may be made the configuration of those other than adsorption Rota (10). For example, an adsorption member is formed in rectangle tabular and wrap covering is constituted for the part movable in the direction of a field of an adsorption member, and you may make it reproduce an adsorption member, making a playback room change, and may make it other configurations.

[0061] Moreover, the above-mentioned air cleaner (1) You may use for the air-conditioning system combined with the conditioner. In that case, an air-conditioning system is the above-mentioned air cleaner (1). It receives, and an electrostatic precipitator can be arranged to the upstream of air, a conditioner can be arranged to the downstream, and it can constitute. An electrostatic precipitator can give a charge to suspended matter, such as dust in air, using corona discharge, and what was constituted so that uptake of this electrified suspended matter might be carried out to an electrode can be used for it. Furthermore, an electrostatic precipitator and an air cleaner (1) In between, a pre-filter may be arranged, and you may constitute so that the tar of the cigarette contained in air etc. may be removed beforehand.

[0062] Thus, an electrostatic precipitator and an air cleaner (1) Since harmony air is generable after removing an odor component and an injurious ingredient, while removing the dust which floats in air if a conditioner is arranged in order and an air-conditioning system is constituted, the interior of a room is maintainable in the very comfortable and pure condition.

[0063] Moreover, in addition to the catalyst structure (25) of the above-mentioned operation gestalt, another catalyst structure may be added and prepared in the location of the upstream of adsorption Rota (10) in a free passage room (17) and a playback room (16) etc. If it does in this way, in the catalyst structure (25) being located in the upstream of adsorption Rota (10), the pure air for playback will pass adsorption Rota (10), and desorption, such as an odor component, will be performed effectively.

[0064] Moreover, as a photocatalyst, it is TiO₂. CdS, CdSe, WO₃ and Fe₂O₃, SrTiO₃, ZnO,

ZnO₂ and RuO₂, Cs₃Sb, InAs, InSb, GaAs, etc. the thing that supported these and supported metals, such as platinum, at the base may be used for others. Furthermore, an ultraviolet ray lamp etc. may be used for a luminescence means (14) that what is necessary is just to include a photocatalyst in the front face of adsorption Rota (10) at least.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, if a certain amount of time amount passes using an air cleaner, suspended matter, such as dust in processed air, will adhere to the front face of an adsorption member, and dirt will be gradually accumulated in it. For this reason, the draft resistance of an adsorption member becomes large and there is a possibility that the adsorption engine performance of equipment may fall. On the other hand, although it is also possible to prepare the device in which the dirt of the front face of an adsorption member is removed in an air cleaner, there is a possibility that an equipment configuration may be complicated and cost may become high in that case.

[0006] The place which this invention is originated in view of such a trouble, and is made into the purpose is enabling it to prevent adsorption performance degradation, suppressing complication of the configuration of an air cleaner, and the rise of cost.

MEANS

[Means for Solving the Problem] Paying attention to the point of having the operation into which a photocatalyst disassembles dirt, this invention includes a photocatalyst in an adsorption member, and is made to carry out decomposition removal of the dirt.

[0008] Concretely the 1st solution means which this invention devised The adsorption member containing the adsorbent which adsorbs the odor component or injurious ingredient in processed air (10), The playback room as space which reproduces a part of adsorption member (10) (16). It is premised on the air cleaner equipped with the heat catalyst (25) which carries out oxidative degradation of the odor component or injurious ingredient from which it was desorbed to heating means (24) to desorb an odor component or an injurious ingredient from an adsorption member (10) in a playback room (16), such as a heater. And while equipping an adsorption member (10) with a luminescence means (14) to irradiate light, an adsorption member (10) considers as the configuration which contains at least the photocatalyst activated by the exposure of the light from a luminescence means (14) on a front face.

[0009] Moreover, in the solution means of the above 1st, an adsorption member (10) considers the 2nd solution means which this invention devised as the configuration which contains the photocatalyst at 2 to 20% of a rate to an adsorbent. In addition, a photocatalyst can be made about 5% to an adsorbent as a more desirable rate.

[0010] Moreover, in the above 1st or the 2nd solution means, while the 3rd solution means which this invention devised prepares wrap covering (15) for a part of adsorption member (10) and forms a playback room (16) in this covering (15), it arranges a luminescence means (14) out of this covering (15).

[0011] Moreover, in the above 1st thru/or the 3rd solution means of any 1, the 4th solution means which this invention devised constitutes an adsorption member as approximate circle

tabular adsorption Rota (10), and establishes the driving means (12) which carries out the rotation drive of this adsorption Rota (10).

[0012] - With the solution means of the operation-above 1st, if an adsorption member (10) fully adsorbs the odor component or injurious ingredient in processed air, this adsorption member (10) will be reproduced in a playback room (16). In a playback room (16), an adsorption member (10) is heated at the heater formed as a heating means (24), and an odor component and an injurious ingredient are desorbed from an adsorption member (10). moreover, the air which oxidative degradation of the odor component desorbed from the adsorption member (10) or the injurious ingredient was carried out by a heat catalyst (25) being activated, and contained the odor component and the injurious ingredient --less -- bromination -- or it is defanged. And what is necessary is just to discharge the air after processing from a playback room (16) to outside the plane.

[0013] Moreover, with this 1st solution means, since the adsorption member (10) contains the photocatalyst, if light is irradiated from a luminescence means (14) at an adsorption member (10), a photocatalyst will be activated, and the dirt adhering to the front face of an adsorption member (10) will be disassembled and removed. Moreover, the activated photocatalyst decomposes the odor component and injurious ingredient by which the front face of an adsorption member (10) was adsorbed, and also performs no-odor-izing or the operation to defang.

[0014] Moreover, with the solution means of the above 2nd, since the rate of a photocatalyst to an adsorbent is specified, when a photocatalyst is superfluously included in an adsorption member (10), such an adsorbent fall can be suppressed to an adsorbent decreasing and adsorbent falling. Moreover, as a photocatalyst, it is TiO₂. Although used, extent which has such a photocatalyst itself can also demonstrate disintegration also from having adsorbent, suppressing the fall of the adsorption capacity force, unless the content of a photocatalyst is superfluous.

[0015] Moreover, with the solution means of the above 3rd, while playback of the adsorption member (10) by the desorption of an odor component or an injurious ingredient is performed in a playback room (16), disassembly of the dirt by the photocatalyst etc. is performed out of a playback room (16).

[0016] Moreover, with the solution means of the above 4th, if the luminescence means (14) is arranged in accordance with radial [of adsorption Rota (10)] Since light can be irradiated at whole adsorption Rota (10) while adsorption Rota (10) takes at least 1 round if a luminescence means (14) is made to emit light when adsorption Rota (10) rotates, decomposition removal of the dirt can be carried out all over adsorption Rota (10).

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view showing the outline structure of the air cleaner concerning the operation gestalt of this invention.

[Drawing 2] It is the front view of the air cleaner of drawing 1 .

[Drawing 3] It is the conceptual diagram showing the flow of the air in the air cleaner of an operation gestalt.

[Drawing 4] It is the schematic diagram showing installation at the works of the air cleaner of drawing 1 .

[Drawing 5] It is the mimetic diagram showing the flow of the air in the air cleaner concerning the modification 1 of an operation gestalt.

[Drawing 6] It is the outline block diagram of the air cleaner concerning the modification 2 of an operation gestalt.

[Description of Notations]

- (1) Air cleaner
- (10) Adsorption Rota (adsorption member)
- (11) Frame
- (12) Motor (driving means)
- (12a) Driving pulley
- (13) The belt for a drive
- (14) Black light lamp (luminescence means)
- (15) Covering
- (16) Playback room
- (17) Free passage room
- (18) Seal path
- (18a) Purge section
- (19) Shield
- (20) The blower for playback
- (21) Air installation path
- (22) Air discharge path
- (23) Playback air duct
- (24) Electric heater
- (25) Heat catalyst (catalyst structure)
- (26) Heat exchanger

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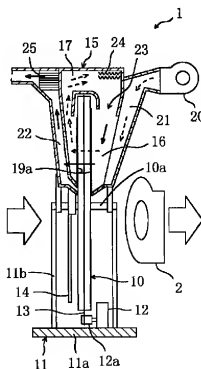
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(54) 【発明の名称】 空気浄化装置

(57) 【要約】

【課題】 室内空気を吸着部材(10)で浄化するとともに、臭気成分や有害成分を吸着した吸着部材(10)を高温空気中で再生できるようにした空気浄化装置(1)において、装置構成の複雑化やコストの上昇を抑えながら、吸着性能の低下を長期にわたって防止する。

【解決手段】 吸着部材(10)に光触媒を含ませて、吸着部材(10)に光を照射することで光触媒を活性化させ、光触媒による汚れの分解作用で吸着部材(10)を清浄な状態に維持し、吸着性能を確保する。



【特許請求の範囲】

【請求項1】 被処理空気中の臭気成分または有害成分を吸着する吸着剤を含有した吸着部材(10)と、吸着部材(10)の一部を再生する空間としての再生室(16)と、再生室(16)内で吸着部材(10)から臭気成分または有害成分を脱離させる加熱手段(24)と、脱離した臭気成分または有害成分を酸化分解する熱触媒(25)とを備えた空気浄化装置であって、吸着部材(10)に光を照射する発光手段(14)を備え、吸着部材(10)が、少なくとも表面上に、発光手段(14)からの光の照射により活性化する光触媒を含有している空気浄化装置。

【請求項2】 吸着部材(10)は、光触媒を吸着剤に対して2%から20%の割合で含んでいる請求項1記載の空気浄化装置。

【請求項3】 吸着部材(10)の一部を覆うカバー(15)を備え、該カバー(15)内に再生室(16)が形成され、該カバー(15)外に発光手段(14)が配置されている請求項1または2記載の空気浄化装置。

【請求項4】 吸着部材が略円板状の吸着ロータ(10)に構成されるとともに、吸着ロータ(10)を回転駆動する駆動手段(12)を備えている請求項1ないし3の何れか1記載の空気浄化装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、被処理空気中の臭気成分または有害成分を吸着部材で吸着するとともに、吸着したこれらの成分を高温度で触媒により酸化分解して無臭化または無害化する空気浄化装置に関し、特に、吸着性能の低下防止技術に係るものである。

【0002】

【従来の技術】従来より、空気浄化装置は、例えば、空気中のたばこ臭、食品臭、尿尿臭、体臭、ペット臭、バナー臭、建築臭、油煙、VOC、NO_xなどの臭気成分や有害成分を除去するため、店舗、医療機関、工場などで用いられている。

【0003】従来の空気浄化装置では、例えば特開平10-277365号公報に記載されているように、ゼオライト等の吸着剤をバインダーで固めて円板状などに成形した吸着部材が用いられている。この吸着部材は、被処理空気を通り抜けるように通気性を有し、被処理空気通過の際に臭気成分や有害成分を吸着剤に吸着することで、これらの成分を被処理空気から除去するように構成されている。

【0004】上記公報に記載された装置では、円板状の吸着部材を駆動モータで回転可能に構成するとともに、吸着部材の一部を覆うカバーを設け、該カバー内に脱離再生手段として触媒板とヒータとを配設している。そして、カバーの外に露出した部分(吸着部)で被処理空気

を浄化する一方、該吸着部が臭気成分や有害成分を充分に吸着すると、吸着部材を回転させて該吸着部をカバー内で加熱する。このことにより、臭気成分や有害成分を吸着部材から脱離させながら、活性化した触媒でこれらの成分を分解して無臭化または無害化するようにしている。

【0005】

【発明が解決しようとする課題】しかし、空気浄化装置を使用してある程度の時間が経過すると、吸着部材の表面に、被処理空気中の塵埃などの浮遊物が付着して、汚れが徐々に蓄積されてしまう。このため、吸着部材の通風抵抗が大きくなり、装置の吸着性能が低下するおそれがある。これに対して、吸着部材の表面の汚れを除去する機構を空気浄化装置に設けることも可能であるが、その場合には、装置構成が複雑化してコストが高くなるおそれがある。

【0006】本発明は、このような問題点に鑑みて創案されたものであり、その目的とするところは、空気浄化装置の構成の複雑化やコストの上昇を抑えながら、吸着性能の低下を防止できるようにすることである。

【0007】

【課題を解決するための手段】本発明は、光触媒が汚れを分解する作用を有している点に着目し、吸着部材に光触媒を含ませて汚れを分解除去するようにしたものである。

【0008】具体的に、本発明が講じた第1の解決手段は、被処理空気中の臭気成分または有害成分を吸着する吸着剤を含有した吸着部材(10)と、吸着部材(10)の一部を再生する空間としての再生室(16)と、再生室(16)内で吸着部材(10)から臭気成分または有害成分を脱離させるヒータなどの加熱手段(24)と、脱離した臭気成分または有害成分を酸化分解する熱触媒(25)とを備えた空気浄化装置を前提としている。そして、吸着部材(10)に光を照射する発光手段(14)を備えるとともに、吸着部材(10)が、少なくとも表面上に、発光手段(14)からの光の照射により活性化する光触媒を含有する構成としたものである。

【0009】また、本発明が講じた第2の解決手段は、上記第1の解決手段において、吸着部材(10)が、光触媒を吸着剤に対して2%から20%の割合で含有している構成としたものである。なお、より好ましい割合として、光触媒は吸着剤に対して5%程度にすることができる。

【0010】また、本発明が講じた第3の解決手段は、上記第1または第2の解決手段において、吸着部材(10)の一部を覆うカバー(15)を設けて、このカバー(15)内に再生室(16)を形成する一方、このカバー(15)外に発光手段(14)を配置したものである。

【0011】また、本発明が講じた第4の解決手段は、上記第1ないし第3の何れか1の解決手段において、吸

着部材を略円板状の吸着ロータ(10)として構成し、この吸着ロータ(10)を回転駆動する駆動手段(12)を設けたものである。

【0012】一作用—上記第1の解決手段では、被処理空気中の臭気成分または有害成分を吸着部材(10)が十分に吸着すると、再生室(16)内で該吸着部材(10)の再生を行う。再生室(16)内では、加熱手段(24)として設けられるヒータ等により吸着部材(10)が加熱され、臭気成分や有害成分が吸着部材(10)から脱離する。また、吸着部材(10)から脱離した臭気成分や有害成分は、熱触媒(26)が活性化することで酸化分解され、臭気成分や有害成分を含んだ空気が無臭化または無害化される。そして、処理後の空気は、再生室(16)から機外へ排出すればよい。

【0013】また、この第1の解決手段では、吸着部材(10)が光触媒を含んでいるため、発光手段(14)から吸着部材(10)に光を照射すると、光触媒が活性化して、吸着部材(10)の表面に付着した汚れが分解され、除去される。また、活性化した光触媒は、吸着部材(10)の表面に吸着された臭気成分や有害成分を分解して、無臭化または無害化する作用も行う。

【0014】また、上記第2の解決手段では、吸着剤に対する光触媒の割合を特定しているため、吸着部材(10)に光触媒を過剰に含ませた場合には吸着剤が少なくなつて吸着性が低下するのに対して、そのような吸着性の低下を抑えられる。また、光触媒としては例えば TiO_2 が用いられるが、このような光触媒自体がある程度は吸着性を有していることから、光触媒の含有量が過剰でない限りは、吸着能力の低下を抑えながら分解作用も発揮できる。

【0015】また、上記第3の解決手段では、臭気成分や有害成分の脱離による吸着部材(10)の再生が再生室(16)内で行われる一方、光触媒による汚れの分解等は再生室(16)外で行われる。

【0016】また、上記第4の解決手段では、発光手段(14)を例えば吸着ロータ(10)の半径方向に沿って配置しておけば、吸着ロータ(10)が回転するときに発光手段(14)を発光させると、吸着ロータ(10)が少なくとも1周する間に吸着ロータ(10)の全体に光を照射できるので、吸着ロータ(10)の全面で汚れを分解除去することができる。

【0017】

【発明の効果】上記第1の解決手段によれば、臭気成分や有害成分を吸着した吸着部材(10)を加熱手段(24)で再生し、かつ、脱離したこれらの成分を熱触媒(26)で分解しながら、光触媒により、吸着部材(10)の表面の汚れを分解除去できる。したがって、時間が経過しても吸着部材(10)の表面に汚れが付着しにくいので、吸着部材(10)の通風抵抗が大きくなるのを防止して、装置の吸着性能が低下するのを抑えられる。また、光触媒を用いて汚れを分解除去するようにしたこと、汚れを機械的な動き

で除去する機構などを不要にしているため、装置構成の複雑化やコストアップも抑えられる。

【0018】また、上記第2の解決手段によれば、吸着部材(10)に含まれる吸着剤と光触媒の割合を適正な範囲に特定しているため、吸着部材(10)における吸着性能と汚れの分解除去性能をバランスよく高いレベルで両立できる。

【0019】また、上記第3の解決手段によれば、吸着部材(10)を再生する再生室(16)の外に、吸着部材(10)の汚れを除去する発光手段(14)を設けているので、吸着部材(10)に吸着された臭気成分や有害成分を再生室(16)内で確実に脱離して分解しながら、同時に再生室(16)の外では吸着部材(10)の汚れを分解除去できる。

【0020】また、上記第4の解決手段によれば、吸着ロータ(10)を回転させることにより、発光手段(14)を1カ所に設けるだけでも、吸着ロータ(10)が1周する間に該吸着ロータ(10)の全体に光を照射することが可能となる。したがって、吸着部材(10)が静止したタイプの空気浄化装置では該吸着部材(10)の全体に光を照射しようとするのと多数の発光手段が必要となるのに対して、そのような多数の発光手段を設けることは不要となる。

【0021】

【発明の実施の形態】以下、本発明の実施形態を図面に基づいて詳細に説明する。

【0022】図1は、本実施形態に係る空気浄化装置

(1)の概略構造を示す断面図であり、図2は、空気浄化装置の正面図である。なお、これらの図は本発明の構成を概念的に示したもので、装置(1)の具体構成を限定するものではない。

【0023】この空気浄化装置(1)は、円板状の吸着ロータ(吸着部材)10が、フレーム(11)で回転可能に保持されている。そして、送風機(2)を起動して被処理空気を吸着ロータ(10)に通過させ、被処理空気中の臭気成分や有害成分を該吸着ロータ(10)で吸着することにより該空気を浄化するように構成されている。

【0024】フレーム(11)は、ベース(11a)とスタンド部材(11b)とから構成されている。ベース(11a)は、例えばアングル材などの型钢で枠組みしてその上面に鉄板などを貼り付けて形成され、スタンド部材(11b)は4本の軽量型钢やパイプなどをベース(11a)に固定して構成されている。スタンド部材(11b)の上端部には、図示しない軸受ユニットを介して、吸着ロータ(10)の中心に固定された回転軸(10a)が回転可能に保持されている。

【0025】ベース(11a)には、吸着ロータ(10)を回転駆動する駆動手段として、モータ(12)が固定されている。モータ(12)には図示しない減速機構などを介して駆動プリー(12a)が連結され、この駆動プリー(12a)と吸着ロータ(10)に駆動用ベルト(13)が掛けられている。そして、モータ(12)を駆動することにより、吸着ロータ(10)を回転させることができるようにしている。

【0026】吸着ロータ(10)は、ゼオライト等の吸着剤と、 TiO_2 等の光触媒とをバインダで固めて円板状に成形され、吸着剤に対する光触媒の割合は2~20%、好ましくは約5%となるように設定されている。この吸着ロータ(10)は、例えばハニカム状に成形されて、被処理空気が厚さ方向に通るように通気性を有している。そして、吸着ロータ(10)は、被処理空気が通過する際に臭気成分や有害成分を吸着剤に吸着することで、これらの成分を被処理空気から除去する。具体的に、吸着ロータ(10)は、空気中のアンモニア、アセトアルデヒド、トリメチルアミン、メチルメルカプタンなどの悪臭成分や、一酸化炭素、ホルムアルデヒドのような有害成分を吸着して除去することができる。

【0027】また、上記光触媒は、光を照射して活性化させることにより、吸着ロータ(10)の表面に吸着された臭気成分や有害成分を分解するとともに、被処理空気中の塵埃などの浮遊物が吸着ロータ(10)の表面に付着して発生した汚れを分解して除去することができる。そして、光触媒に光を照射するため、フレーム(11)には発光手段としてブラックライトランプ(14)が固定されている。ブラックライトランプ(14)は、主として360nm前後の紫外放射を発する一方、可視放射をほとんど出さないもので、高圧水銀ランプまたは蛍光灯が用いられる。このブラックライトランプ(14)は、吸着ロータ(10)の回転軸(10a)から下方へ向かって鉛直に配置されている。なお、上記光触媒は、被処理空気が吸着ロータ(10)を通過する際に、被処理空気中の臭気成分や有害成分を吸着する吸着剤としての性質も有している。

【0028】一方、吸着ロータ(10)は、その周方向の一部分が両面からカバー(15)によって覆われており、カバー(15)は、上記回転軸(10a)を挟んでブラックライトランプ(14)と対向する位置(回転軸(10a)の鉛直上方)に設けられている。このカバー(15)は、フレーム(11)のステータ部材(11b)に固定されている、該カバー(15)の内側に再生室(16)が区画形成されている。再生室(16)は、吸着ロータ(10)の上方に位置する連通室(17)を介して、吸着ロータ(10)の両面に亘って設けられている。

【0029】なお、図示の例では、カバー(15)は中心角の小さな扇形に形成して、吸着ロータ(10)が再生室(16)内に位置する部分(以下、再生部という)の面積を、再生室(16)の外側に位置する部分(以下、吸着部という)の面積よりもかなり狭い範囲にしているが、カバー(15)の中心角を例えば5°から180°程度の範囲内で変更して、再生部と吸着部の割合を調整することも可能である。

【0030】上記カバー(15)内には、再生室(16)の両側縁部に沿って吸着ロータ(10)に外気を通過させるシール通路(18)が設けられている。シール通路(18)は、概略の空気流れ図である図3に示しているように、再生室(16)の両側縁部に設けられた幅の狭いバージ部(18a, 18a)

が、吸着ロータ(10)を挟んで対向配置されることにより構成されている。相対するバージ部(18a, 18a)は、一方が吹出し側、他方が吸入側となっており、それぞれ、再生室(16)に遮蔽板(19)を隔てて配置されている。各遮蔽板(19)は、図1に示すように、内側の端縁(19a)が吸着ロータ(10)の表面と僅かな隙間を隔てて位置するように形成され、再生室(16)の内部空間とバージ部(18a)の内部空間を区画している。

【0031】吹出し側のバージ部(18a)は、再生用送風機(20)が設けられた空気導入通路(21)と連通している。一方、吸込み側のバージ部(18a)は、具体的な構造は示していないが、カバー(15)の上部に設けられた連通室(17)を介して再生室(16)と連通している。また、再生室(16)は、空気排出通路(22)と連通している。このため、空気導入通路(21)に送られた外気は、シール通路(18)を流れるときに両バージ部(18a)の間で吸着ロータ(10)を横切って、さらに連通室(17)から再生室(16)に導入された後、空気排出通路(22)から排出される。そして、空気導入通路(21)、シール通路(18)、連通室(17)、再生室(16)、及び空気排出通路(22)からなるカバー(15)内の空間全体が、再生空気通路(23)を構成している。

【0032】カバー(15)内には、電気ヒータ(24)と触媒構造体(25)とが配設されている。電気ヒータ(24)は連通室(17)内に設けられており、再生空気通路(23)内で吸着ロータ(10)の再生位置の上流側に位置している。また、触媒構造体(25)は空気排出通路(22)内に位置している。以上の構成において、電気ヒータ(24)により再生空気通路(23)を流れる空気を介して吸着ロータ(10)が加熱され、臭気成分または有害成分が該吸着ロータ(10)から脱離して該吸着ロータ(10)が再生される。そして、吸着ロータ(10)から脱離した臭気成分や有害成分を含んだ高温空気によって触媒構造体(25)が加熱されることで、これらの臭気成分または有害成分が無臭化または無害化される。

【0033】上記触媒構造体(25)は、詳細は図示していないが、例えば多数の六角形の空気通過孔を形成して表面積を大きくしたハニカム状(またはその他の種々の形状)の基材の表面に、触媒層を形成したものとすることができる。触媒は、例えば Al_2O_3 、 ZrO_2 、 CoO_2 、 SiO_2 及びゼオライトのうちから選ばれた1種類以上の金属酸化物または該金属酸化物と金属の複合酸化物との混合物を担体とし、該担体に、触媒成分としてAg、Pd、Pt、Mn及びRhのうちから選ばれた1種類以上の金属、該金属を含む合金もしくは該金属の酸化物、またはこれらの2種類以上の混合物が担持されて構成されている。そして、所定温度に加熱されて活性化し、臭気成分または有害成分を分解して無臭化または無害化する。

【0034】また、上記電気ヒータ(24)は、例えば棒状の発熱体に多数の伝熱フィンを一体化して、伝熱面積を拡大したものとすることができる。発熱体の具体的な形

状や構造は、電気ヒータ(24)を配置する部分の形状などに応じて適宜設定されればよいが、具体的には例えばサーモヒータ、半導体ヒータまたはセラミックヒータなどを用いることができる。なお、本実施形態では電気ヒータ(24)は1カ所にだけ設けているが、触媒構造体(25)に対して空気の上流側近傍にもヒータを配置して、吸着部材(10)の再生用の上記ヒータ(24)と、触媒加熱用の図示しないヒータとを別にしてもよい。また、その場合、触媒加熱用のヒータの表面に触媒層を形成すれば、触媒加熱用のヒータと触媒構造体(25)とを一体化することも可能である。

【0035】以上の構成において、再生用送風機(20)を駆動すると、図1及び図3に概略の空気の流れを示すように、外気が空気導入通路(21)からシール通路(18)に送られ(図1の破線矢印の気流)、さらに連通室(17)において電気ヒータ(24)を通過した後、再生室(16)に流入する。この空気は、再生室(16)内で吸着ロータ(10)を通過した後、空気排出通路(22)を通り、触媒構造体(25)を通過して外部に排出される(図1の実線矢印の気流)。

【0036】本実施形態において、空気浄化は吸着ロータ(10)がカバー(15)の外に出ている部分(吸着部)を使って行われる。そして、この吸着部が臭気成分や有害成分を充分に吸着してほぼ飽和状態に達すると、再生室(16)内で再生を行う。

【0037】この空気浄化装置(1)は工場などに設置され、図4に示すように、工場内で臭気や有害ガスを発生する複数の機械(M)とダクト(D)で接続され、これらの機械(M)の排ガスなどを該ダクト(D)から吸い込んで吸着ロータ(10)により無臭化または無害化するように構成されている。そして、各機械(M)で発生した臭気成分や有害成分が広い空間に拡散する前にダクト(D)で吸い込む方式を採用したことで、広い場所でも複数の空気浄化装置を用いずに、1台の空気浄化装置(1)で処理できるようにしている。

【0038】なお、この空気浄化装置(1)は、工場の他に、商業ビルや医療機関などに設置して複数の部屋とダクトで接続し、各部屋の空気中の臭気成分や有害成分を除去するのに用いてもよい。また、この空気浄化装置(1)は、パチンコ遊技場などの娯楽施設の広い室内空間において、臭気等の強い複数のゾーンの天井部分とダクトで接続し、各ゾーンの臭気成分や有害成分を除去するのに用いてもよい。

【0039】—運転動作—
次に、この空気浄化装置(1)の運転動作について具体的に説明する。

【0040】まず、空気浄化運転中は、駆動モータ(12)を起動して吸着ロータ(10)を回転させた状態で、各送風機(2,20)を起動する。そうすると、この空気浄化装置(1)では、再生室(16)内に位置する再生部が狭い領域に、再生室(16)外に位置する吸着部が広い領域に形成さ

れているため、空気浄化がその広い吸着部を使って効率的に行われ、被処理空気から臭気成分や有害成分が除去される。なお、これらの臭気成分や有害成分は、吸着剤だけでなく光触媒にもある程度は吸着される。

【0041】このとき、カバー(15)内では電気ヒータ(24)にも通電されて、再生処理も同時に行われる。この吸着ロータ(10)の再生時の空気の流れについて具体的に説明すると、まず、外気は空気導入通路(21)からシール通路(18)を流れる。シール通路(18)では、空気は吹出し側のバージ部(18a)から吸着ロータ(10)を横切って吸込み側のバージ部(18a)へ流入する。このとき、吸着ロータ(10)を通過する空気が常温であるため、シール通路(18)では、吸着ロータ(10)に付着した臭気成分や有害成分の脱離は行われず、外気は、既に加熱されている吸着ロータ(10)から熱を吸収しながら通過する。

【0042】吸込み側のバージ部(18a)に入った空気は、カバー(15)内の上部に設けられた連通室(17)へ流入し、既に発熱している電気ヒータ(24)によってさらに加熱される。高温になった空気は、吸着ロータ(10)を通過する。このように高温の空気が吸着ロータ(10)を通過することにより、再生室(16)内において、吸着ロータ(10)から臭気成分や有害成分が脱離する。また、脱離したこれらの成分は、再生空気に含まれて空気排出通路(22)を流れる。このとき、高温の空気が流れることで触媒が活性化するので、吸着ロータ(10)から脱離したこれらの成分が酸化分解されて無臭化または無害化される。

【0043】本実施形態において、再生室(16)内で吸着ロータ(10)が空気を図1の右から左へ通過する際(実線の矢印参照)、臭気成分や有害成分が脱離するが、再生室(16)の両側縁部においてシール通路(18)を流れる気流(破線の矢印参照)がシールドとして作用するため、再生室(16)から外部へ臭気が漏れることはない。臭気成分等を含んだ空気が仮に逆遮蔽板(19)の外に流れ出たとしても、その空気はシール通路(18)を流れる空気に含まれて再度連通室(17)から再生室(16)に流入することになり、外部への臭気漏れは防止される。また、高温空気の熱も同様に、連通室(17)から再生室(16)へ流れる空気にも吸収される。そして、吸着ロータ(10)を再生した後の空気は、触媒構造体(25)を通過することにより、臭気成分や有害成分が分解された清浄な空気として空気排出通路(22)から機外に放出される。

【0044】一方、空気浄化装置(1)の運転中は、ブラックライトランプ(14)が発光し、カバー(15)の外で吸着ロータ(10)に光が照射される。このため、吸着ロータ(10)の表面において光触媒が活性化し、該吸着ロータ(10)の表面に吸着された臭気成分や有害成分がある程度分解される。また、吸着ロータ(10)を被処理空気通過することで、吸着ロータ(10)の表面には空気中の塵埃などの浮遊物が付着して汚れが付くが、光触媒が活性化することによってこの汚れが分解除去される。したがって、吸着ロー

タ(10)の表面が長時間に亘って清浄な状態に維持される。

【0045】一実施形態の効果一

以上のように、本実施形態によれば、吸着ロータ(10)の表面に汚れがほとんど付着しないので、時間が経過しても吸着ロータ(10)の通風抵抗が大きくなるのを防止できる。このため、装置(1)の吸着性能を長期にわたって維持できる。また、吸着ロータ(10)の表面の汚れを機械的な動きで除去する機構を設ける必要がないので、装置構成が複雑化したりコストが高くなったりするのを抑えられる。

【0046】さらに、本実施形態によれば、吸着ロータ(10)の再生を行うことで、吸着ロータ(10)を交換しなくても空気浄化性能が低下せず、高い浄化性能を維持できる。なお、吸着ロータ(10)にはカビの胞子や空気中の浮遊菌もかなりの割合で付着するが、吸着ロータ(10)の再生時の加熱によりこれらを死滅させることができるので、カビ等が原因で発生する臭気も抑えることができる。

【0047】また、本実施形態では、カバー(15)は比較的に狭い領域に形成し、空気浄化に使用する吸着部の面積を大きくしているため、その広い面積を使って充分な空気浄化性能を確保できる。そして、吸着ロータ(10)の一部(つまりカバー(15)の外部の吸着部)を利用して空気を浄化しながら、同時に他の一部(つまり再生室(16)内の再生部)で吸着ロータ(10)を再生するようにしているため、吸着ロータ(10)の表面に汚れが付着しないことと相まって、空気浄化運転を途切れさせることなく長期にわたって継続することができる。

【0048】一実施形態の変形例一

<変形例1>上記実施形態においては、例えば図5に既述の空気の流れを示すように、上記空気導入通路(21)を流れる空気と、空気排出通路(22)から排出される空気との間で熱交換を行う熱交換器(26)を設けてもよい。この熱交換器(26)には、例えば放熱フィン付の螺旋管熱交換器や、二重管熱交換器などを用いることができる。

【0049】このように構成すると、外気は、まず熱交換器(26)を通過するときに、排出される処理済みの空気が有している熱により加熱される。外気は、この熱では吸着ロータ(10)の臭気成分等を脱離させるほどには加熱されず、再生室(16)の両側のシール通路(18)を流れるときには吸着ロータ(10)を通過するだけである。その後、空気は実施形態と同様に連通室(17)を通るときに電気ヒータ(24)で高温に加熱されて再生室(16)に入る。したがって、この高温空気により、吸着ロータ(10)から臭気成分や有害成分が脱離する。

【0050】その後、空気は再生室(16)から空気排出通路(22)を通じて清浄な空気となり、外部に排出されるときに熱交換器(26)を通る。したがって、処理後の空気は、外部から導入されてくる空気に熱を与えて冷却され

てから機外へ排出されることになる。

【0051】したがって、電気ヒータ(24)の能力を抑えても空気を効率的に加熱でき、吸着ロータ(10)からの臭気成分や有害成分の脱離と触媒の活性化を十分に行うことができることとなり、省エネルギー化を図ることが可能となる。

【0052】<変形例2>上記実施形態では、吸着用の送風機(2)と再生用の送風機(20)とを別々に用いているが、図6に示すように、再生用の送風機を用いる代わりに、浄化後の清浄な空気の一部(全体の1割程度)を吸着ロータ(10)の再生に用いるようにしてもよい。具体的に、図示の例では、浄化後の空気を室内に導入するダクト(30)に分岐ダクト(31)を接続し、この分岐ダクト(31)にダンパ(32)を設けて、再生用空気の流量を調整しながら再生部に供給できるようにしている。

【0053】このようにすれば、装置(1)で用いる送風機の個数を減らすことができ、故障のおそれが少なくなるため、装置(1)の信頼性を高められる。また、浄化した後の清浄な空気を再生に利用する点、吸着ロータ(10)から臭気成分等が脱離しやすい利点がある。

【0054】<変形例3>上記実施形態の空気浄化装置(1)では、常に吸着ロータ(10)を回転させて空気浄化と再生を同時に連続して行うようにしているが、空気浄化中に吸着ロータ(10)を間欠的に回転させて再生するようにしてもよい。

【0055】具体的には、例えば空気浄化運転を所定時間行うと駆動モータ(12)を起動して吸着ロータ(10)を所定角度回転させるようにタイマーを利用してもよいし、吸着ロータ(10)の吸着部の下流側での空気中の臭気成分や有害成分の濃度を検出し、その濃度が所定値を越えたら浄化性能が低下したと判断して駆動モータ(12)を起動するようにしてもよい。なお、例えばタイマーを利用する場合は、日中の人の活動時間内に空気浄化を行って、夜間の人のいないときに再生を行うようにしたり、1日のうち何回か吸着と再生を繰り返すようにしたりすることができる。このようにしても、空気浄化運転を途切れさせることなく継続することは可能である。

【0056】また、他の運転方法として、吸着ロータ(10)の全体を使って空気浄化を行った後に、再生をまとめて行うようにしてもよい。この場合、空気浄化運転中は、駆動モータ(12)を停止して吸着ロータ(10)を静止させた状態で、送風機(2)を起動する。そうすると、カバー(15)の外に位置する広い吸着部を使って室内空気から臭気成分や有害成分が除去される。

【0057】一方、この状態で吸着ロータ(10)の空気浄化性能が低下すると、駆動モータ(12)を起動して吸着ロータ(10)を所定角度回転させ、再生用送風機(20)と電気ヒータ(24)に通電して吸着ロータ(10)の再生処理を開始する。そして、再生室(16)内の部分の再生が終わると、吸着ロータ(10)を再度所定角度回転させて次の部分を再

生し、この部分的な再生を何度か繰り返すことで吸着ロータ(10)を全体に再生するとよい。

【0058】この場合、吸着ロータ(10)の再生を、空気導入通路(21)から外気を導入しながら、再生室(16)の内部の空気を空気排出通路(22)から排出して行うため、再生時に吸着ロータ(10)を加熱することで水蒸気が発生した場合には、その水蒸気も排出される。したがって、再生の終了後に装置(1)が常温まで冷却されても装置(1)内に結露が生じるのを防止できる。このため、結露が原因で装置(1)内にカビや錆が発生したり、室内に水滴が漏れたりするのを防止できる利点もある。

【0059】

【発明のその他の実施形態】また、本発明は、上記実施形態について、以下のような構成としてもよい。

【0060】例えば、上記各実施形態では吸着部材を吸着ロータ(10)とし、該吸着ロータ(10)を駆動モータ(12)で回転駆動するように構成しているが、吸着部材は吸着ロータ(10)以外の構成にしてもよい。例えば、吸着部材を矩形板状に形成し、その一部を覆うカバーを吸着部材の面方向に可動に構成して、再生室を移動させながら吸着部材を再生するようにしてもよいし、その他の構成にしてもよい。

【0061】また、上記空気浄化装置(1)は、空気調和装置と組み合わせた空気調和システムに用いてもよい。その場合、空気調和システムは、上記空気浄化装置(1)に対し、空気の上流側に電気集塵装置を、下流側に空気調和装置を配置して構成することができる。電気集塵装置は、例えばコロナ放電を利用して空気中の塵埃などの浮遊物に電荷を与え、この帯電した浮遊物を電極に捕集するように構成したものを用いることができる。さらに、電気集塵装置と空気浄化装置(1)の間には、プレフィルタを配置して、空気中に含まれた煙草のヤニなどを予め除去するように構成してもよい。

【0062】このように電気集塵装置と空気浄化装置(1)と空気調和装置とを順に配置して空気調和システムを構成すると、空気中に浮遊する塵埃などを除去するとともに臭気成分や有害成分を取り除いたうえで調和空気を生成することができるので、室内を極めて快適で清浄な状態に維持することができる。

【0063】また、上記実施形態の触媒構造体(25)に加えて、連通室(17)内や再生室(16)内などで吸着ロータ(10)の上流側の位置に、別の触媒構造体を追加して設けてもよい。このようにすれば、触媒構造体(25)が吸着ロータ(10)の上流側に位置することで、再生用の清浄な空

が吸着ロータ(10)を通過することになり、臭気成分等の脱離が効果的に行われる。

【0064】また、光触媒としては、 TiO_2 の他にも、例えば、 CdS 、 $CdSe$ 、 WO_3 、 Fe_2O_3 、 $SrTiO_3$ 、 ZnO 、 ZnO_2 、 RuO_2 、 Cs_3Sb 、 $InAs$ 、 $InSb$ 、 $GaAs$ 等や、これらをベースに白金等の金属を担持したものなどを用いてもよい。さらに、光触媒は、少なくとも吸着ロータ(10)の表面に含ませておけばよく、発光手段(14)には、紫外線ランプなどを用いてもよい。

【図面の簡単な説明】

【図1】本発明の実施形態に係る空気浄化装置の概略構造を示す断面図である

【図2】図1の空気浄化装置の正面図である。

【図3】実施形態の空気浄化装置における空気の流れを示す概念図である。

【図4】図1の空気浄化装置の工場での設置を示す概略図である。

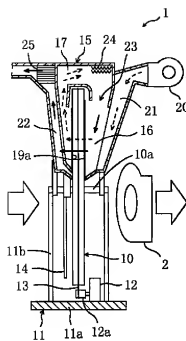
【図5】実施形態の変形例1に係る空気浄化装置における空気の流れを示す模式図である。

【図6】実施形態の変形例2に係る空気浄化装置の概略構成図である。

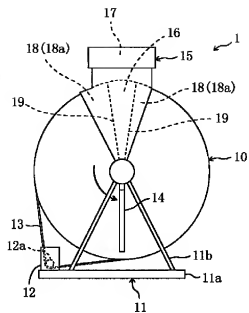
【符号の説明】

- (1) 空気浄化装置
- (10) 吸着ロータ (吸着部材)
- (11) フレーム
- (12) モータ (駆動手段)
- (12a) 駆動ブリー
- (13) 駆動用ベルト
- (14) ブラックライトランプ (発光手段)
- (15) カバー
- (16) 再生室
- (17) 連通室
- (18) シール通路
- (18a) パージ部
- (19) 遮蔽板
- (20) 再生用送風機
- (21) 空気導入通路
- (22) 空気排出通路
- (23) 再生空気通路
- (24) 電気ヒータ
- (25) 熱触媒 (触媒構造体)
- (26) 熱交換器

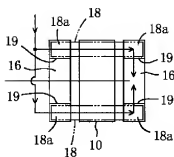
【図1】



【図2】

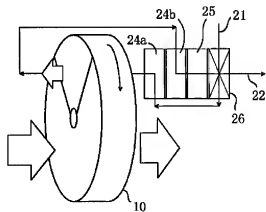
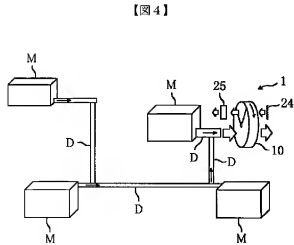


【図3】

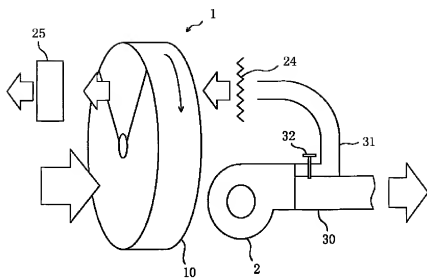


【図5】

【図4】



【図6】



フロントページの続き

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